

Understanding the nature of basements and water

2-in.-thick rigid foam glued to rim joist

Plywood strip blocks air.

1x3 strapping, 16 in. o.c.

Finish walls and ceilings with ½-in. drywall.

2x4 stud wall

2-in.-thick rigid foam glued to foundation wall

Seam tape seals joints between panels.

Subfloor (two layers of ½-in.-thick plywood secured with concrete screws)

1-in.-thick rigid foam laid over concrete floor

In summer, warm, damp air infiltrates and condenses on the concrete foundation.

Vapor barriers can cause damage by sealing moisture in the wall cavity, where it promotes rot.

Expanded-polystyrene (EPS) rigid-foam insulation is semipermeable and won't trap moisture; it also isolates the wood framing from contact with damp concrete.

Don't block moisture with finishes such as vinyl flooring or oil-base paints. Instead, use cork or wood flooring, carpet, and latex-base paints.

A waterproof foundation that's adequately drained prevents flooded basements.

Moisture moves from wet to dry and from warm to cool. In the summer, damp soils and warm air outside make the moisture drive mostly inward. Humid outside air enters the basement and condenses on anything below its dew point: cold-water pipes, concrete walls, and floors. In particular, carpeted concrete floors can be a problem because they easily can become wet enough to support mold and dust mites.

Most basements dry out only in the winter when interior heat sucks the available moisture out of the basement and drives some moisture outward through the exposed portion of the foundation. There's also some drive-out through the foundation itself because the basement is warmer than the surrounding soil. The trouble is that the soil tends to be wet, and so has a limited capacity for drying.

There's a significant energy cost in moving this water through the foundation. The traditional response has been to frame walls next to the foundation, fill them with fiberglass, and seal them with a plastic vapor barrier. But a basement vapor barrier can trap moisture and promote rot. Basement floors built with a similar system fare no better.